

Claims

1. A method of reducing paging-related delays for anticipated target mobile stations (MS), the method comprising:
 - 5 anticipating by a radio access network (RAN) that an MS is likely to be a target of communication not yet initiated;
when a loading level of a serving cell of the MS is below an assignment threshold, assigning a traffic channel to the MS to avoid paging-related delays for the MS should the MS become a target of communication.
- 10 2. The method of claim 1, wherein the loading level of the serving cell comprises a traffic channel loading level of the serving cell.
3. The method of claim 1, further comprising:
 - 15 paging the MS in cells that have a loading level below the assignment threshold.
4. The method of claim 3, wherein paging the MS comprises paging the MS in a manner that gives higher paging priority to pages for MSs for which
20 communication has already been initiated.
5. The method of claim 3, further comprising:
 - receiving a page response from the MS that indicates an MS signal strength;
 - 25 assigning a traffic channel to the MS when the MS signal strength is above a signal strength threshold, even though communication targeting the MS has not been initiated yet.

6. The method of claim 3, further comprising:
receiving a page response from the MS that indicates a number of MS
signaling legs;

5 assigning a traffic channel to the MS when the number of MS signaling
legs is below a signaling-leg threshold, even though communication targeting
the MS has not been initiated yet.

7. The method of claim 1, further comprising:

10 signaling the MS in at least one cell that has a loading level between
the assignment threshold and an upper threshold to transition to at least one
operational mode in which paging-related delays for the MS are reduced.

8. The method of claim 1, wherein anticipating that an MS is likely to be a
target of communication not yet initiated comprises receiving an indication
15 from the group consisting of an indication that the MS is newly available to a
group of associated communication devices wherein each of the group of
associated communication devices is related to the MS as a messaging
buddy, a presence query for the MS, a presence state update from the MS
indicating that the MS is no longer in an offline presence state, an indication
20 that a buddy of MS has become newly available, an indication that a message
addressed to the MS is being composed, an indication that an address book
listing associated with the MS has been recently accessed, an indication that
messaging associated with the MS has been recently accessed, an indication
that the MS requires emergency responder status, and an indication that the
25 MS is in an active messaging mode.

9. The method of claim 8, wherein the messaging associated with the MS
comprises messaging from the group consisting of data burst messaging
(DBM), short data burst (SDB) messaging, short message service (SMS)
30 messaging, voice mail messaging, e-mail messaging, presence messaging,
and Caller ID messaging.

10. The method of claim 8, wherein the indication that the MS is in an active messaging mode comprises recent messaging from the MS from the group consisting of data burst messaging, short message service (SMS) messaging, short data burst (SDB) messaging, and broadcast programming request messaging, wherein the indication that the MS is in an active messaging mode comprises recent messaging for the MS from the group consisting of data burst messaging, SMS messaging, SDB messaging, voice mail notification messaging, and email notification messaging.
- 10 11. The method of claim 1, wherein the at least one operational mode comprises MS modes from the group consisting of a semi-dormant mode, an unslotted mode, a control hold mode, a speculative scanning mode, and a reduced slot cycle index (RSCI) mode, wherein the MS performs periodic location updates in the semi-dormant mode.

12. A method of reducing paging-related delays for anticipated target mobile stations (MS), the method comprising:

anticipating by a radio access network (RAN) that an MS is likely to be a target of communication not yet initiated;

5 signaling the MS to transition to at least one operational mode in which paging-related delays for the MS are reduced.

13. The method of claim 12, wherein signaling the MS comprises:

10 in at least one cell in which a loading level is below an upper threshold, signaling the MS to transition to at least one operational mode in which paging-related delays for the MS are reduced.

14. The method of claim 13, wherein the loading level comprises a paging channel loading level of the serving cell.

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15. The method of claim 13, wherein signaling the MS comprises:

signaling the MS in at least one cell that has a loading level between an assignment threshold and the upper threshold to transition to at least one operational mode in which paging-related delays for the MS are reduced.

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16. The method of claim 15, wherein cells that have a loading level between the assignment threshold and the upper threshold associated with one of three groups according to their individual loading levels, a high load group, a medium load group, and a low load group, and wherein signaling comprises:

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signaling the MS in at least one cell in the high load group to transition to a reduced slot cycle index (RSCI) mode;

30 signaling the MS in at least one cell in the medium load group to transition to a semi-dormant mode, wherein the MS performs periodic location updates in the semi-dormant mode;

signaling the MS in at least one cell in the low load group to transition to a control hold mode.

17. The method of claim 13, further comprising:

when no response to previous signaling is received, signaling the MS,
in at least one cell in which a loading level is above the upper threshold, to
transition to at least one operational mode in which paging-related delays for
the MS are reduced.

18. The method of claim 17, further comprising:

when no response to previous signaling is received, signaling the MS,
in at least one cell in which the MS has not yet been signaled, to transition to
at least one operational mode in which paging-related delays for the MS are
reduced.

19. The method of claim 12, wherein signaling the MS comprises signaling
the MS in a manner that gives higher signaling priority to MSs for which
communication has already been initiated.

20. The method of claim 12, wherein anticipating that an MS is likely to be
a target of communication not yet initiated comprises receiving an indication
from the group consisting of an indication that the MS is newly available to a
group of associated communication devices wherein each of the group of
associated communication devices is related to the MS as a messaging
buddy, a presence query for the MS, a presence state update from the MS
indicating that the MS is no longer in an offline presence state, an indication
that a buddy of MS has become newly available, an indication that a message
addressed to the MS is being composed, an indication that an address book
listing associated with the MS has been recently accessed, an indication that
messaging associated with the MS has been recently accessed, an indication
that the MS requires emergency responder status, and an indication that the
MS is in an active messaging mode.

21. The method of claim 20, wherein the messaging associated with the MS comprises messaging from the group consisting of data burst messaging (DBM), short data burst (SDB) messaging, short message service (SMS) messaging, voice mail messaging, e-mail messaging, presence messaging, and Caller ID messaging.

22. The method of claim 20, wherein the indication that the MS is in an active messaging mode comprises recent messaging from the MS from the group consisting of data burst messaging, short message service (SMS) messaging, short data burst (SDB) messaging, and broadcast programming request messaging, wherein the indication that the MS is in an active messaging mode comprises recent messaging for the MS from the group consisting of data burst messaging, SMS messaging, SDB messaging, voice mail notification messaging, and email notification messaging.

23. The method of claim 20, wherein the group of associated communication devices includes a threshold number of members.

24. The method of claim 20, wherein the group of associated communication devices includes a threshold number of available members.

25. The method of claim 20, wherein the group of associated communication devices includes a threshold percentage of available members.

26. The method of claim 12, wherein the at least one operational mode comprises MS modes from the group consisting of a semi-dormant mode, an unslotted mode, a control hold mode, a speculative scanning mode, and a reduced slot cycle index (RSCI) mode, wherein the MS performs periodic location updates in the semi-dormant mode.

27. The method of claim 26, wherein signaling the MS comprises signaling the MS to transition to the at least one operation mode for a particular period of time.
- 5 ⁴27. The method of claim 26, wherein signaling the MS comprises signaling the MS to transition to the semi-dormant mode for a maximum number of reports.
28. The method of claim 12, further comprising:
- 10 receiving an indication from the MS that MS battery life is low, wherein the at least one operational mode in which paging-related delays for the MS are reduced is limited to a reduced slot index mode (RSCI).

29. A radio access network (RAN) comprising:
wireless transceiver equipment adapted to support signaling
transmission and reception for each cell of a plurality of cells;
a communications controller, communicatively coupled to the wireless
5 transceiver equipment for each cell of the plurality of cells,
adapted to anticipate that a mobile station (MS) is likely to be a
target of communication not yet initiated,
adapted, when a loading level of a serving cell of the MS is
below an assignment threshold, to assign a traffic channel to the MS to avoid
10 paging-related delays for the MS should the MS become a target of
communication.
30. The RAN of claim 29, wherein the communications controller is further
adapted to page the MS in cells that have a loading level below the
15 assignment threshold.
31. The RAN of claim 29, wherein the communications controller is further
adapted to signal the MS in at least one cell that has a loading level between
the assignment threshold and an upper threshold to transition to at least one
20 operational mode in which paging-related delays for the MS are reduced.
32. The RAN of claim 29, wherein anticipating by the communications
controller that an MS is likely to be a target of communication not yet initiated
comprises receiving an indication from the group consisting of an indication
25 that the MS is newly available to a group of associated communication
devices wherein each of the group of associated communication devices is
related to the MS as a messaging buddy, a presence query for the MS, a
presence state update from the MS indicating that the MS is no longer in an
offline presence state, an indication that a buddy of MS has become newly
30 available, an indication that a message addressed to the MS is being
composed, an indication that an address book listing associated with the MS
has been recently accessed, an indication that messaging associated with the
MS has been recently accessed, an indication that the MS requires

emergency responder status, and an indication that the MS is in an active messaging mode.

33. The RAN of claim 32, wherein the messaging associated with the MS
5 comprises messaging from the group consisting of data burst messaging (DBM), short data burst (SDB) messaging, short message service (SMS) messaging, voice mail messaging, e-mail messaging, presence messaging, and Caller ID messaging.
- 10 34. The RAN of claim 32, wherein the indication that the MS is in an active messaging mode comprises recent messaging from the MS from the group consisting of data burst messaging, short message service (SMS) messaging, short data burst (SDB) messaging, and broadcast programming request
15 messaging, wherein the indication that the MS is in an active messaging mode comprises recent messaging for the MS from the group consisting of data burst messaging, SMS messaging, SDB messaging, voice mail notification messaging, and email notification messaging.
- 20 35. The RAN of claim 29, wherein the at least one operational mode comprises MS modes from the group consisting of a semi-dormant mode, an unslotted mode, a control hold mode, a speculative scanning mode, and a reduced slot cycle index (RSCI) mode, wherein the MS performs periodic location updates in the semi-dormant mode.

36. A radio access network (RAN) comprising:
wireless transceiver equipment adapted to support signaling
transmission and reception for each cell of a plurality of cells;
a communications controller, communicatively coupled to the wireless
5 transceiver equipment for each cell of the plurality of cells,
adapted to anticipate that a mobile station (MS) is likely to be a
target of communication not yet initiated,
adapted to signal the MS to transition to at least one operational
mode in which paging-related delays for the MS are reduced.

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37. The RAN of claim 36, wherein signaling the MS comprises:
in at least one cell in which a loading level is below an upper threshold,
signaling the MS to transition to at least one operational mode in which
paging-related delays for the MS are reduced.

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38. The RAN of claim 37, wherein signaling the MS comprises:
signaling the MS in at least one cell that has a loading level between
an assignment threshold and the upper threshold to transition to at least one
operational mode in which paging-related delays for the MS are reduced.

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39. The RAN of claim 36, wherein anticipating that an MS is likely to be a
target of communication not yet initiated comprises receiving an indication
from the group consisting of an indication that the MS is newly available to a
group of associated communication devices wherein each of the group of
25 associated communication devices is related to the MS as a messaging
buddy, a presence query for the MS, a presence state update from the MS
indicating that the MS is no longer in an offline presence state, an indication
that a buddy of MS has become newly available, an indication that a message
addressed to the MS is being composed, an indication that an address book
30 listing associated with the MS has been recently accessed, an indication that
messaging associated with the MS has been recently accessed, an indication
that the MS requires emergency responder status, and an indication that the
MS is in an active messaging mode.

40. The RAN of claim 39, wherein the messaging associated with the MS comprises messaging from the group consisting of data burst messaging (DBM), short data burst (SDB) messaging, short message service (SMS) messaging, voice mail messaging, e-mail messaging, presence messaging, and Caller ID messaging.

41. The RAN of claim 39, wherein the indication that the MS is in an active messaging mode comprises recent messaging from the MS from the group consisting of data burst messaging, short message service (SMS) messaging, short data burst (SDB) messaging, and broadcast programming request messaging, wherein the indication that the MS is in an active messaging mode comprises recent messaging for the MS from the group consisting of data burst messaging, SMS messaging, SDB messaging, voice mail notification messaging, and email notification messaging.

42. The RAN of claim 36, wherein the at least one operational mode comprises MS modes from the group consisting of a semi-dormant mode, an unslotted mode, a control hold mode, a speculative scanning mode, and a reduced slot cycle index (RSCI) mode, wherein the MS performs periodic location updates in the semi-dormant mode.